

The eggs of the extinct Egyptian population of White-tailed Eagle *Haliaeetus albicilla*

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SUMMARY.—Little is known concerning the biology of the now extinct Egyptian population of White-tailed Eagle *Haliaeetus albicilla*, and few specimens remain in museums to assess its alleged subspecific status. Here we describe three eggs collected near Lake Manzala and review the collection data and anecdotal reports about this species, to provide a better understanding of the biology of White-tailed Eagles in this southernmost part of their former breeding range.

White-tailed Eagle *Haliaeetus albicilla* is now a rare and irregular winter visitor to Egypt (Goodman & Meininger 1989), but has long been claimed as a former breeding bird at the lakes of lower Egypt (Meinertzhagen 1930, Cramp & Simmons 1980, Goodman & Meininger 1989). These claims are based solely on 19th-century published descriptions by the German explorers and ornithologists Martin Theodor von Heuglin (1824–76) and Alfred Edmund Brehm (1829–84), and observations by the British politician and agriculturalist, the Hon. Murray Finch-Hatton, 12th Earl of Winchilsea and seventh Earl of Nottingham (1851–98).

Until now, data on egg specimens in museum collections have not been used to corroborate breeding by White-tailed Eagle in Egypt. The recent discovery of a single Egyptian *H. albicilla* egg amongst unregistered material at the Natural History Museum (NHM), Tring, has provided the opportunity to re-examine evidence of breeding by *H. albicilla* in Egypt and to summarise published and specimen breeding data. In total, just three eggs of the Egyptian White-tailed Eagle are currently known in museums: the NHM Tring specimen and a clutch of two eggs held in Stuttgart at the Staatliches Museum für Naturkunde (SMNS).

Evidence of *Haliaeetus albicilla* breeding in Egypt

The isolation of the Egyptian population from the White-tailed Eagle's core range and its supposed morphological distinctiveness from northern populations led both Theodor von Heuglin (1856) and A. E. Brehm (1856) to describe it as a new species from the environs of Lake Manzala: *Haliaeetus cinereus* von Heuglin, 1856 (February) and *Haliaeetus funereus* A. E. Brehm, 1856 (May / June) (Fig. 1). Both names were first published as *nomina nuda* by Brehm's father, Christian Ludwig Brehm (Brehm 1855). Sharpe (1874) only noted the use by Ludwig Brehm, placing both *H. cinereus* and *H. funereus* in synonymy with *H. albicilla* (Linnaeus, 1758) where they have remained.

Travel in 1847–53 with Johann Wilhelm von Müller (as secretary and assistant) gave A. E. Brehm his first opportunity to collect and study the birds of Egypt. In an account on *Haliaeetus* species from Egypt, Brehm (1856) described White-tailed Eagles as follows: 'During winter one can see one of them regularly on the lakes of lower and central Egypt, which to me appears to differ from *Hal. albicillus*, which is why I consider it as a distinct, independent species. The bird stays in Egypt long into spring and, according to my Arab hunters, breeds at Lake Menzaleh [*sic*]' (translated from German by GM & FW).

At around the same time, in the early 1850s, von Heuglin also visited Egypt. His short (1856) description of White-tailed Eagles there stated: 'On the lakes of lower Egypt

lives a white-tailed sea eagle, which may differ from the northern one or at least represent a constant climatic variety. Specifically, the adult bird is completely ash-grey and the white tail-feathers, namely the outer ones, are speckled brownish on their outer vanes. Furthermore it may generally have somewhat smaller proportions. Near Damiette [*sic*] it is called 'Óqab' [name in Arabic] or Shometta [name in Arabic] and breeds there on collapsed reed stems in *Arundo donax* [giant cane] etc.—Should it prove to be a new species, I suggest the name *Haliaëtos cinereus* for it.' (Translated from German by GM & FW.)

In his later account of Egyptian White-tailed Eagles, von Heuglin (1869) made no reference to either his or Brehm's 1856 taxonomic descriptions, but again alluded to the population's distinctiveness and behaviour: 'The white-tailed sea eagle of Egypt can perhaps be regarded as a separate, smaller, climatic variety. It lives, in our experience, as a resident around the lagoons of lower Egypt, namely on lake Mazalah [*sic*]. Usually one sees it in pairs, even during winter, when incidentally the number of these audacious raptors is perhaps augmented by northern visitors. [. . .] In the extensive reed-forests around the Behéreh (Lake Manzalah [*sic*] and surroundings) our bird builds its large nest in March. Here it often lacks suitable trees, it therefore resorts to the reed beds. In the tallest, densest and most impenetrable parts it folds reed stems in an area of a fathom until they form a solid basis for the actual nest which stands only a few feet above water level and is protected by overhanging reeds. A very large and flat nest stood on top of several acacia trees 2–3 feet in height, which shaded a low dune. We received a clutch with two almost un-incubated eggs; they are bluntly egg-shaped of 2".7''' in length by 2".1''' in width, somewhat rough-shelled, dirty blue-greenish white with a few washed-out brown blotches and at different parts, finely speckled dark brown. On the Red Sea or the actual Nile I have never encountered the sea eagle.' (Translated from German by GM & FW.)

Contradicting these descriptions of von Heuglin and Brehm, Saunders who examined skins obtained by Murray Finch-Hatton (Table 1) noted they were: 'very white around the head but not more so than in many European examples' (Meinertzhagen 1930). Von Heuglin gave some of his eggs collected in Africa to Richard Freiherr von Koenig-Warthaussen for later description (Heuglin 1869). After his death in 1911, Koenig-Warthaussen's egg collection remained at the residential castle of Sommershausen. In 1955, the collection comprising c.12,500 eggs was donated to the SMNS by Elisabeth Baronin von Koenig-Warthaussen. This egg collection holds two likely candidate eggs (Fig. 2) and information on the label (in the hand of Koenig-Warthaussen) stored with these eggs states:

Aegyptischer See=Adler, *Haliaëtos albicilla* ♂ *cinereus* v. Heugl.

Africa, Aegypten. Damiette [*sic*], 12 April 1861, 2 St. Gelege. Dr. Th. v. Heuglin.

Nest auf einem Hügelrücken auf Mimosengebüsch hoch aufgethürmt; brütet auch auf zusammen=geknickten Stengeln von *Arundo donax*.

(Der alte Vogel ganz aschgrau mit aussen bräunlich bespritzten Fahnen der weißen Schwanzfedern.)

Egyptian Sea Eagle, *Haliaëtos albicilla* var. *cinereus* v. Heugl.

Africa, Egypt, Damietta, 12 April 1861, two specimens [in] clutch. Dr. Th. v. Heuglin.

Nest on a ridge on a *Mimosa* shrub stacked tall; breeds also on folded stems of *Arundo donax*.

(The adult bird is ash-grey with outer vanes of white tail-feathers maculated brownish).

(Translated from the original German by GM & FW)

TABLE 1

Collection data and measurements of known skin and egg specimens of White-tailed Eagles *Haliaeetus albicilla* from the Egyptian population. The mean and minimum measurements in the two bottom rows are based on 150 *H. albicilla* eggs from the core breeding range (Schönwetter 1960–92).

Institution	Specimen	Register number	Collector	Locality	Date	Length mm (inches)	Breadth mm (inches)	Weight (g)
AMNH	Skin, Lectotype	535537	A. E. Brehm	L. Menzaleh	2.6. 1849			
Unknown	Skin, Holotype?	Unknown	Heuglin	Damiette	Unknown			
Unknown	Skin	Unknown	Finch-Hatton	L. Menzaleh	1873			
Unknown	Skin	Unknown	Finch-Hatton	L. Menzaleh	1873			
Unknown	Skin	Unknown	Unknown	Desert of Suez	<1871			
SMNS	Egg	76113	Heuglin	Damiette	12.4.1861	68.6 (2.70)	55.4 (2.18)	10.7
SMNS	Egg	76113	Heuglin	Damiette	12.4.1861	71.0 (2.79)	56.8 (2.24)	14.3
NHM	Egg	2009.2.1	Finch-Hatton	L. Menzaleh	11.1.1873	72.1 (2.84)	58.4 (2.29)	14.7
Schönwetter (1960–92) mean egg dimensions						74.7	57.1	14.0
Schönwetter (1960–92) minimum egg dimensions						66.0	53.0	11.35

This match between the published account (Heuglin 1869) and the label suggests that the SMNS eggs were obtained but not collected by Heuglin himself (other specimens in the Warthausen collection suggest he was near Sakkara at the time). Furthermore, the single measurement given for the two eggs matches the smaller of the two eggs held at the SMNS exactly. Heuglin (1869) also contains a colour reproduction of one of the *H. albicilla* eggs, which despite some ‘artistic licence’ is similar to the larger SMNS egg in pattern at the pointed, but not the blunt end. Despite Heuglin’s detailed description, Shelley (1871) doubted the breeding of *H. albicilla* in Egypt. In contrast, Gurney (1871) drew attention to Heuglin’s account, as well as noting an immature specimen from the ‘Desert of Suez’, Egypt, in the Museum of the Jardin des Plantes, Paris.

The third egg (Fig. 3), held in Tring, has no accompanying label or other written documentation, but is legibly inscribed ‘*Haliaeetus albicilla*, Lake Menzaleh [sic], 11 Jan 1873’. No further information as to the collector is recorded, but there is strong circumstantial evidence implicating Finch-Hatton. Meinertzhagen (1930) quoted, but gave no date for, correspondence between Finch-Hatton and the well-known British ornithologist, Howard Saunders (1835–1907) describing *H. albicilla* breeding in Egypt: ‘... several nests of this species were found upon the ground in the reedy marshes of Lake Menzaleh [sic], and two adults were shot’. Saunders (1889) gave further details of nests found by Finch-Hatton: ‘One found by the Hon. Murray Finch-Hatton (now Lord Winchilsea) in the marshes of Lower Egypt, resembled a gigantic nest of the Marsh-Harrier [*Circus aeruginosus*], being raised to a considerable height above the deep mud by which it was surrounded. Eggs, usually 2 in number, dull white in colour, and measuring about 2’85 by 2’2 in., are laid in Scotland in April; but as early as February or March in the southeast of Europe, and January in Egypt’.

Saunders’ account is significant for two reasons: firstly, he specifically mentioned Egyptian *H. albicilla* breeding in January rather than April; secondly, the measurements he quoted are very close to those of the NHM egg (Table 1). This suggests that Saunders may well have known details of or possessed the NHM egg at some point. Moreover, although the exact timing and details of Finch-Hatton’s Egyptian visit are uncertain, it is clear that he was in Egypt at the time the egg was collected, as Chennells (1893) included reference

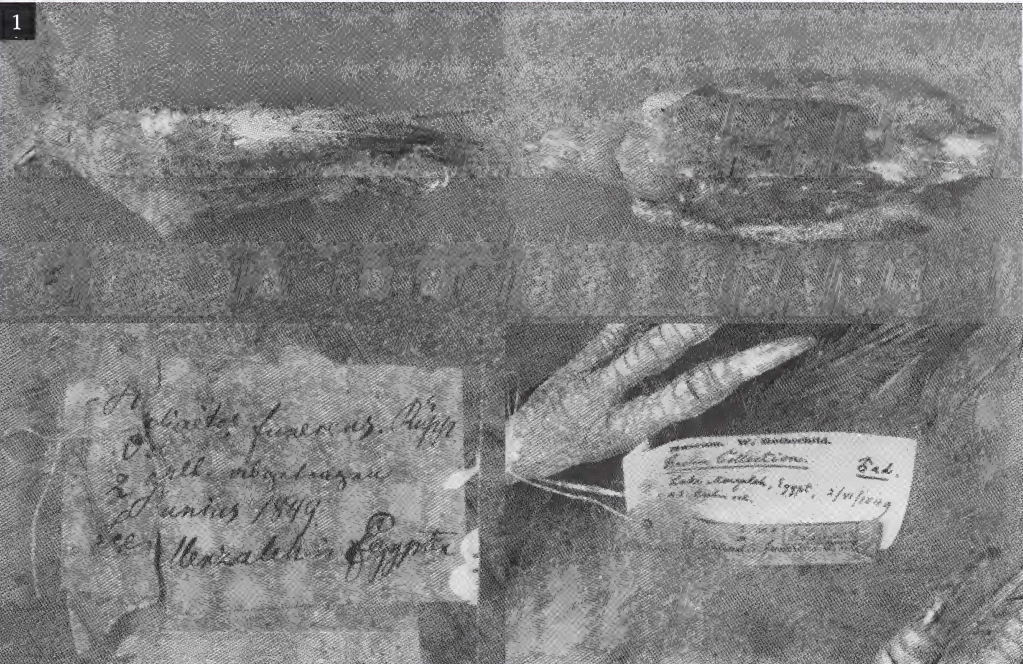


Figure 1. AMNH 535537, holotype of *Haliaeetus funereus*, from Lake Menzaleh [sic], Egypt, 2 June 1849. Top left and right: the same specimen in lateral and dorsal views. White tail-feathers but grey back eliminate both Pallas’s *H. leucoryphus* and African Fish Eagles *H. vocifer*. Original label (bottom left) states that the plumage was worn on collection. Bottom right, AMNH label (Matt Shanley, © American Museum of Natural History, New York)



Figure 2. SMNS 76113, *Haliaeetus albicilla*, Damiette, Egypt, 12 April 1861. Presumed clutch of two and accompanying handwritten label; size bar in mm (Friederike Woog, © Staatliches Museum für Naturkunde, Stuttgart)

Figure 3. BMNH E/2009.2.1, *Haliaeetus albicilla*, Lake Menzaleh [sic], Egypt, 11 January 1873 (four 90° rotations of the single egg on its polar axis); size bar in mm (Harry Taylor, © The Natural History Museum, Tring)

to his return from a voyage up the Nile to Shepherd's Hotel, Cairo, circa March 1873. Finch-Hatton was also well known for his 'eclectic pastimes' which included 'climbing (often up cliffs in pursuit of eagles' eggs, which he collected)' (Readman 2006). Although circumstantial, we propose it is likely that he collected the NHM egg during this trip, later corresponding with Howard Saunders on the subject.

The NHM has no record of receiving an egg collection from Finch-Hatton, but did receive portions of Howard Saunders's collection both directly and via other collectors who obtained material from his collection, notably Henry Seebohm (1832–95) and the Revd. Francis Jourdain (1865–1940). In conclusion, the NHM egg was possibly collected by Finch-Hatton, later passed to Howard Saunders and came either directly to the NHM or indirectly with the Jourdain or Seebohm collections.

No further eggs or skins (Table 1) appear to have been taken after 1873, which thus marks the last confirmed breeding in Egypt. Meinertzhagen (1930) noted that the eagles no longer bred at Manzala. The reasons for the population's disappearance remain uncertain. It is clear, however, that Lake Manzala, and its environs, experienced dramatic localised changes in the late 1800s: e.g. the establishment of Port Saïd, the building and opening of the Suez Canal in 1869, changes in agriculture, increasing commerce and early tourism all had significant effects on the flora and fauna of the area. Ebers (1878) noted: 'It is towards the north, in the vicinity of the lake of Menzaleh [*sic*], that the nature of the land seems to have undergone the most conspicuous change. Where formerly the Semitic herdsman could pasture innumerable cattle on the rich marshy land lie pools of bitter, brackish water'.

We compared the eggs described with those collected from more temperate populations. Visually none of the three eggs differs from those of other White-tailed Eagles (Table 1). Equal-variance *t*-tests comparing the mean length, width and weight of the Egyptian population to the published average for *H. albicilla* eggs (Schönwetter 1960–92) were also non-significant ($t_2 = -2.00$, $p = 0.18$; $t_2 = -0.14$, $p = 0.91$; $t_2 = -0.30$, $p = 0.79$, respectively). The eggs also fall within the size range of eggs laid by two other *Haliaeetus* species reported as vagrants from Egypt, African Fish Eagle *H. vocifer* (Goodman & Meininger 1989) and, doubtfully, Pallas's Fish Eagle *H. leucoryphus* (Meinertzhagen 1930, Schönwetter 1960–92). The description of the *Mimosa* bush nest site bears resemblance to typical nesting sites of the Lappet-faced Vulture *Torgos tracheliotus*, but its eggs exceed in length those described here by at least 1 cm (Schönwetter 1960–92).

Discussion

The eggs described here corroborate the existence of a breeding population of *H. albicilla* in Egypt in the mid 1800s. This population represented one of only two breeding populations of the species in Africa and was at the southernmost limit of the White-tailed Eagle's range (Cramp & Simmons 1980, BirdLife International 2009). Other breeding attempts almost as far south have been reported for Algeria, Israel Syria, northern Iran and central Iraq, all of which populations are now believed extinct, except that in northern Iran (Evans 1994, Shirihi 1996, Isenmann & Moali 2000, Murdoch & Betton 2009). All three eggs were collected near Damietta at Lake Manzala (31°27'N, 31°50'E), and the spread of years of specimen collection, from the lectotype of *H. funereus* in 1849 (Hartert 1918) to the eggs in 1861 and 1873, suggests that White-tailed Eagles inhabited Lake Manzala continuously and were not just sporadic breeders as they were elsewhere in the south of their range, e.g. in Israel (Cramp & Simmons 1980). This period also stretches beyond the 20 years of known maximum age of *H. albicilla* (Cramp & Simmons 1980) further supporting the idea of an established breeding population at Lake Manzala.

The Egyptian *H. albicilla* eggs held at NHM and SMNS provide an opportunity to investigate the biology of this extinct population of White-tailed Eagles. Detailed study of the egg shells might reveal adaptations in pore density or shell thickness that could help to regulate water loss (Ar *et al.* 1974) in the hot climate of Lake Manzala, which differs from the cooler conditions of the eagle's core range (Cramp & Simmons 1980). However, we found no immediately obvious difference in size or appearance between the eggs described here and those of more northern populations. In addition, invasive techniques such as genetic sampling of the eggshell membrane (Lee & Prýs-Jones 2008) might help clarify the taxonomic status of the Egyptian White-tailed Eagles. Similarly, stable isotope analysis of shell membranes (Oppel *et al.* 2009) could assist in clarifying their taxonomic status and reveal whether they relied more on fish or waterbirds as food sources during egg laying.

The descriptions of the Egyptian White-tailed Eagles and the data accompanying the eggs highlight two aspects of breeding biology in particular that set apart these populations from their northern conspecifics, regardless of taxonomic status: (1) an unusual choice of nest site and (2) an extended laying period of at least 6–7 months. Egyptian White-tailed Eagles at Manzala did not use the typically preferred nest sites of the species such as steep slopes, cliffs or trees (Cramp & Simmons 1980), but used low bushes or reed nests instead. In most extant populations of White-tailed Eagle, except Iceland, ground nesting is atypical, and occurs usually on islets or a small rocky island or skerry (Cramp & Simmons 1980); to our knowledge, nesting in reeds is unknown in extant populations. The slightly smaller Pallas's Fish Eagle, in contrast, regularly nests in reedbeds (Cramp & Simmons 1980).

The eggs of White-tailed Eagle are similar in size and appearance to those of African and Pallas's Fish Eagles. Nonetheless, it seems unlikely that the specimens described here are eggs of either species. While the nest type might suggest Pallas's Fish Eagle, this species has been recorded as a vagrant to Egypt only once (Meinertzhagen 1930) and the sight record is considered doubtful (Goodman & Meininger 1989). Furthermore, Heuglin (1869) describes the *Haliaeetus* of Egypt as having white tail-feathers, lacking the distinctive black terminal band of Pallas's Fish Eagle, and the extant specimen clearly is *Haliaeetus albicilla* (P. R. Sweet pers. comm.). African Fish Eagle, too, is only a straggler to Egypt (Goodman & Meininger 1989) and Heuglin would surely have reported the presence of this very vocal eagle at Lake Manzala, as he was familiar with the species from the Blue and White Niles (Heuglin 1869).

The laying period of the Egyptian White-tailed Eagles seems to have extended over most of the autumn to spring (October–April). The letter from Finch-Hatton quoted by Meinertzhagen (1930) states that young were close to fledging in January. Assuming 38 days incubation and then 70 days until fledging (Cramp & Simmons 1980), laying would have occurred in October. The egg recently discovered at NHM was collected in January and probably freshly laid, judging by the two very small blowholes (Scharlemann 2001). Heuglin's eggs in SMNS were also 'hardly incubated' but were collected in mid April. In all extant populations the laying period is clearly more restricted, e.g. in Norway, Iceland, northern Russia and Sweden, eggs are laid late March and early April, with repeat laying to early May. In Germany, eggs are laid late February to April. In southern Europe and Russia the first eggs are laid in late January (Cramp & Simmons 1980).

The *H. albicilla* eggs from the now extinct Egyptian population and their associated data highlight interesting differences from the typical breeding biology of White-tailed Eagle and illustrate the species' ability to adapt to a much wider variety of environmental conditions than currently recognised. In addition, the shells themselves can potentially provide an insight into the population's biology.

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